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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,596	03/16/2004	Naoto Matono	12553/130	3887

25693 7590 07/25/2007  
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EXAMINER
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TUGBANG, ANTHONY D

ART UNIT	PAPER NUMBER
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3729

MAIL DATE	DELIVERY MODE
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07/25/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/802,596

Applicant(s)

MATONO, NAOTO

Examiner

A. Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 9-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☒ Certified copies of the priority documents have been received in Application No. 10/175,962.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 10, 2007 has been entered.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 9 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al 5,652,687 and Deroux-Dauphin 4,829,659.

Chen discloses a method of manufacturing a magnetic head comprising: forming a gap layer G with a non-magnetic conductive material; and selectively forming a first pole tip portion P2(T) on the gap layer G by growing a plating film with the gap layer (col. 7, lines 44-48).

The first magnetic layer P2 of Chen is formed with the first pole tip portion P2(T) as the plating film and as a single layer (shown in Fig. 7).

Chen teaches that the gap layer is used for plating of the first pole top portion P2(T), but does not explicitly say that the gap layer is used as an electrode. However, it is noted that the

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gap layer of Chen is inherently capable of being used as “an electrode” for plating of the first pole tip portion because of the *conductive* material, or conductive properties, that the gap layer contains.

As extrinsic evidence, the reference is cited to Deroux-Dauphin that shows that any non-magnetic conductive material (e.g. 12 or 14), or any conductive metal, can be used an electrode to form a plating film of a magnetic material, or magnetic layer (col. 2, lines 13-19 and lines 32-34).

With respect to the process steps being drawn to “a first insulating layer, sandwiched between a second and third insulating layer” (line 6 of Claim 9), these limitations recited in the preamble of the claims are mere intended use limitations and have not been given patentable weight since the body of the claims do not depend upon the preamble for completeness and the process steps are able to stand alone. *In re Hirao*, 535 F.2d 67 190 USPQ 15 (CCPA 1976).

Regarding Claim(s) 13, Chen further teaches that the non-magnetic conductive material of the gap layer can be made from one of: copper, gold, or nickel chromium (col. 6, lines 33-39).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 9 and 13, alternatively, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al and Deroux-Dauphin in view of Santini 6,111,724, referred to hereinafter as Santini'724.

If the applicant(s) believe that the feature of a first insulating layer sandwiched between a second and third insulating layer, recited in the preamble of the claims, is somehow further limiting, then Santini'724 shows that a structure of a thin film magnetic head is known to have a first insulating layer (e.g. 726 in Fig. 22) sandwiched between a second insulating layer (e.g. 724) and a third insulating layer (e.g. 728) to embed a thin film coil (e.g. 720) in a space between first and second magnetic layers.

It is noted that Chen shows a structure that embeds a thin film coil with one single insulating layer.

It would have obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Chen by adding second and third insulating layers, as taught by Santini'724, to form art recognized equivalent thin film magnetic heads, each having insulated and embedded thin film coils.

6. Claims 9 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santini 6,130,809, referred to hereinafter as Santini'809, in view of Chen et al.

Santini discloses a method of manufacturing a magnetic head comprising: a first magnetic layer (e.g. P2/S1 in Fig. 24) having a first pole tip portion; a second magnetic layer (e.g. P1) having a second pole tip portion; each of the pole tip portions (in the pole top regions) to face a recording medium during operation; a gap layer (e.g. 482) sandwiched between the first and second magnetic layers; a thin film coil (e.g. 462) disposed in a space between the first and

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second magnetic layers; an insulating layer (e.g. 454, 476) that fills the space; where the method comprises forming the gap layer (e.g. 482) with a non-magnetic conductive material; and selectively forming the first pole tip portion on the gap layer by growing a plating film with the gap layer where the first magnetic layer and the pole tip portion are formed as the plating film in a single layer (e.g. 484 as P2/P1, col. 15, lines 9-13, Fig. 29AA).

With respect to the process steps being drawn to “a first insulating layer, sandwiched between a second and third insulating layer” (line 6 of Claim 9), these limitations recited in the preamble of the claims are mere intended use limitations and have not been given patentable weight since the body of the claims do not depend upon the preamble for completeness and the process steps are able to stand alone. *In re Hirao*, 535 F.2d 67 190 USPQ 15 (CCPA 1976).

Santini’809 does not specifically say whether or not the gap layer is used as an electrode for plating of the first magnetic layer.

Chen teaches that a gap layer, formed of a non-magnetic conductive material, can be used as a seed layer, or electrode, to subsequently form a first magnetic layer (e.g. P2) including a pole top portion by plating (col. 6, lines 32-36 and col. 7, lines 44-49). Seed layers in plating are inherently used as electrodes as they are used to provide the necessary current and voltage for subsequent electroplating of metal layers. As extrinsic evidence, the references to Uzoh (U.S. Patent 6,117,784, col. 4, lines 13-18) and Woo et al (U. S. Patent 6,103,086, col. 2, lines 59-64) are cited to show that seed layers are inherently used as electrodes for plating.

Regarding Claim(s) 13, Chen mentions that the gap layer is formed of nickel phosphorus or copper (col. 6, lines 32-36).

It is also well worth noting that both Santini'809 and Chen each form art recognized equivalent thin film magnetic heads where each form their first magnetic layer, including their pole tip portion, by plating. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Santini'809 by using the gap layer as an electrode, as taught by Chen, to accurately form and pattern the first magnetic layer with the first pole tip portion by plating within an art recognized equivalent thin film magnetic head.

7. Claims 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santini'809 in view of Chen et al, as applied to Claim 9 above, and further in view of Armstrong et al 5,901,432.

Santini'809, as modified by Chen et al, disclose the claimed manufacturing method as relied upon above. The modified Santini'809 method does not mention selectively etching the gap layer through ion milling by using at least the first pole tip portion as a mask and, subsequently, selectively etching the second magnetic layer to a predetermined depth.

Armstrong utilizes an ion milling process that includes selectively etching a gap layer G through ion milling by using the first pole tip portion P2 as a mask and then, selectively etching the second magnetic layer P1 to a predetermined depth (see Fig. 3K and col. 5, line 64 to col. 6, line 24). The purpose of the ion milling process of Armstrong is to align the pole tips with the gap layer and advantageously minimize any stray flux leakage around the gap layer (col. 1, lines 52-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Santini'809 by utilizing the ion milling process of

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Armstrong, for the advantage of aligning the first and second pole tip portions and minimize any stray flux leakage around the gap layer.

8. Claims 11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santini'809 in view of Chen et al, as applied to Claim 9 above, and further in view of Jones 4,337,132.

Santini'809, as modified by Chen et al, discloses the claimed manufacturing method as relied upon in Claim 9 above. Claim 15 is met for the same reasons as Claim 13 above. The modified Santini'809 method does not teach that an etching speed through ion milling of the non-magnetic conductive material is within a range from being higher than 0.5 times to being no more than 2 times an etching speed of the second magnetic layer.

Santini'809 does further teach that it is well known and conventional to perform ion milling on the gap layer, first magnetic layer (P2) and second magnetic layer (P1) (see Prior Art Figs. 14 and 15), and it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included such features in the above process to accurately align and pattern these layers.

Additionally, Jones shows that etching speeds through ion milling (see Fig. 8) can be achieved by having the speed (e.g. 400) of the non-magnetic conductive material at 1.3 times higher than the etching speed (e.g. 300) of a magnetic material of NiFe. One advantage of having these different etching speeds through ion milling allows accurate vertical side wall patterning with minimum redeposition (col. 1, lines 6-10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Santini'809 by utilizing the etching speeds and non-



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magnetic conductive material of Jones, for the advantages of accurate vertical side wall patterning with minimum redeposition.

9. Claims 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santini'809, Chen et al, and Armstrong et al, as applied to Claims 9 and 10 above, and further in view of Jones, for the same reasons set forth in paragraph 7 above. It is noted that Claim 12 is equivalent to Claim 11 and Claim 16 is equivalent to Claim 13.

10. With respect to the rejections of Claims 9 through 16 in paragraphs 6 through 9 above, if the applicant(s) believe that the feature of a first insulating layer sandwiched between a second and third insulating layer, recited in the preamble of the claims, is somehow further limiting, then the rejections in paragraphs 6 through 9 are hereby repeated, each in view of Santini'724.

Once again Santini'724 shows that a structure of a thin film magnetic head is known to have a first insulating layer (e.g. 726 in Fig. 22) sandwiched between a second insulating layer (e.g. 724) and a third insulating layer (e.g. 728) to embed a thin film coil (e.g. 720) in a space between first and second magnetic layers.

It is noted that Santini'809 shows a structure that embeds a thin film coil with at least one insulating layer.

It would have obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Santini'809 by adding second and third insulating layers, as taught by Santini'724, to form art recognized equivalent thin film magnetic heads, each having insulated and embedded thin film coils.

***Response to Arguments***

11. The applicant(s) arguments filed on May 10, 2007 with respect to Claims 9 through 16 have been fully considered, but are now moot in view of the new ground(s) of rejection set forth above.

***Conclusion***

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 571-272-4570. The examiner can normally be reached on Monday - Friday 7:30 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 571-272-4690. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**/A. Dexter Tugbang/  
Primary Examiner  
Art Unit 3729**

July 18, 2007